Gigabit 1000Base-T
to
1000Base- SX/LX Converter

User's Manual
LCS-C841MC

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FCC WARNING

This equipment has been tested and found to comply with the limits for class A device, pursuant to part 15 of FCC rules. These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communication. Operation of this equipment in a residential area is likely to cause harmful interference, in which case, the user will be required to correct the interference at the user's own expense.

CE

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

Take special note to read and understand all content given in the warning boxes

Warning

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1 Introduction

About This Guide

Welcome

Thank you for choosing 1000Base-T to 1000Base-SX/LX Converter. This device integrates Fast Ethernet copper and fiber segments in a highly flexible package.

Purpose

This guide discusses how to install and configure your 1000Base-T to 1000Base-SX/LX Media Converter.

Terms/Usage

In this guide, the term “Converter” (first letter upper case) refers to your 1000Base-T to 1000Base-SX/LX Converter, and “converter” (first letter lower case) refers to other converters.

Features

- Complies with IEEE 802.3ab 1000Base-T and 802.3z 1000Base-SX/LX standard
- Auto MDI/MDI-X selection for RJ-45 port connection
- Auto polarity correction for RJ-45 Port
- Low power consumption
- Support SC fiber connector for both multi-mode and single mode operations
- Extend fiber distance up to 500m (1650 feet) for multi-mode, 10km (33000 feet) for regular single mode, and 80km (231000 feet) for long haul single mode fiber
- Local & Remote Loopback testing function via DIP switch
- LEDs for quick and easy device status
- External power supply. Used with Mini Converter Chassis Allows Internal Power Supply Configuration
- FCC Class A & CE approved

Specifications

Standard:	IEEE 802.3ab & IEEE 802.3z	
Connector:	1 x fiber optic, 1 x RJ-45	
Max. Distance:	Cat. 5 Twisted Pair: 100m (330ft)	
	Fiber Optic:	
	Multi-mode	500m (1650ft)
	Single Mode	10km (33000ft)
	LH Single Mode	80km (231000ft)
Power:	External power supply, 12V DC@0.8A	
	(Please see Appendix C for Internal Power Supply options)	
Temperature:	Operating:	0 to 50 Celsius
	Storage:	-20 to 70 Celsius
Humidity:	Operating:	10% to 80%RH
	Storage:	5% to 90%RH
Emissions:	FCC Part 15 of Class A & CE approval	
Dimensions:	109.20 x 73.80 x 23.4 mm (LxWxH)	

Package Contents

The 1000Base-T to 1000Base-SX/LX Converter package should include:

- One Converter
- One AC adapter (for external power supply)
- Four pieces self-adhesive pads
- One user's manual

2 Hardware Description

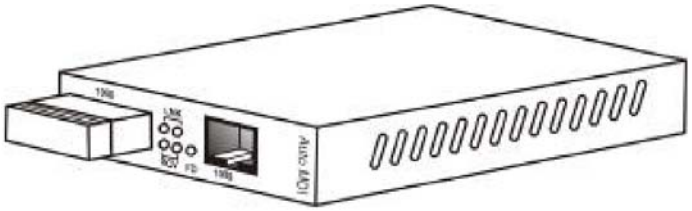
Product Overview

The 1000Base-T to 1000Base-SX/LX switching media Converter is primarily designed for larger workgroups, demanding higher speed and broader bandwidth, and requiring migration and expansion from the copper-based Gigabit to Fiber-based Gigabit network.

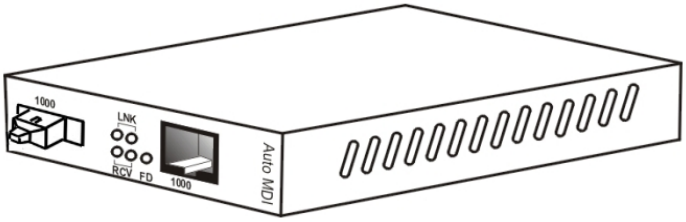
It features an automatic MDI/MDI-X on the RJ-45 port that allows for direct connection to a workstation, switch or hub. Now, the network manager does not need to worry about the cable configuration (crossover or straight through) when establishing connection between RJ-45 ports.

It features both a RJ-45 jack and a choice of fiber optic connectors which allows it to easily integrate a 1000Base-T network to a 1000Base-SX/LX fiber network.

This Converter supports distances of up to 220 meters for multi-mode fiber, 10 kilometers for regular single mode fiber, and up to 80 kilometers for long haul single mode fiber between networking nodes.



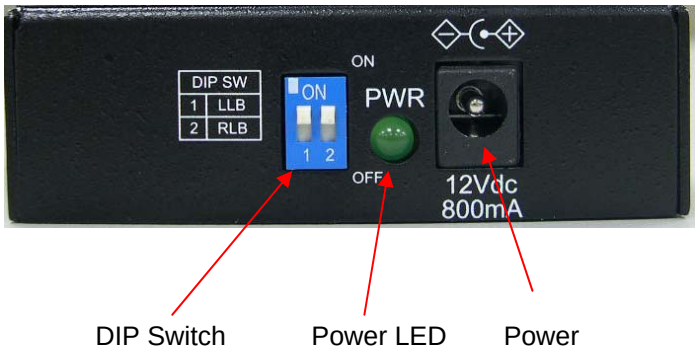
Front Panel View with SC and RJ-45 Connectors



Front Panel View with ST and RJ-45 Connectors

Front View

Rear View



Installing Your Converter

In this chapter, we will take a look at how to install converters within its operating environment. First, it is important to unpack the Converter and ensure that all the components listed in Package Contents are present.

To install your converter, please see the following procedures:

- Location
- MDI/MDI-X Connection
- DIP Switch Settings
- Installing Converter
- Desktop Installation
- Powering On Unit
- Connecting Fiber Cable
- Connecting Copper Cable

Location

The location selected for installing the Converter may greatly affect its performance. When selecting a site, we recommend considering the following rules:

1. Install the Converter in a fairly cool and dry place. See *Technical Specifications* for the acceptable temperature and humidity operating environments.

2. Install the Converter in a location free from strong electromagnetic field generators (such as motors), vibration, dust, and direct exposure to sunlight.

3. Leave at least 10cm of space at the front and rear of the unit for ventilation.

4. Affix the provided rubber pads to the bottom of the Converter for grip, and to protect the case from scratching.

Auto MDI/MDI-X Connection

The auto MDI/MDI-X on the RJ-45 port alleviates the worry of cabling configuration when connecting the Converter with a 1000Base-T device. Whether connecting to a switch, LAN card, or other network device via the RJ-45 port, simply plug and go!

DIP Switch Settings

Use the DIP switch to activate the following operations. Default setting for DIP Switches is “OFF (Disable)” position.

DIP 1: LLB – Local Loopback Enable or Disable at copper port. The Local Loopback function is used to check if the copper segment is functioning properly. The default setting for LLB is Disable. Turn the switch setting Enable to perform the Local Loopback function test.

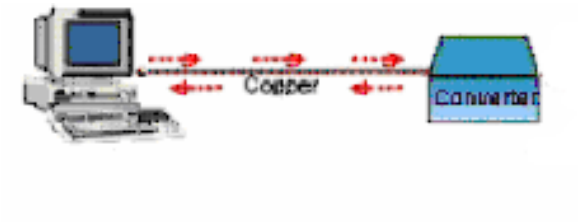


Fig: Local Loopback (LLB)

Note: Enabling the LLB function means, the converter’s normal function will be stopped.

DIP 2: RLB – Remote Loopback Enable or Disable at fiber port. The Remote Loopback function is used to

check if the fiber segment is functioning properly at remote site. The default setting for RLB is Disable. Turn the remote switch's setting Enable to perform the Remote Loopback function test, but disable the LLB and RLB at the converter attached locally.

Note: Enabling the RLB function means, the converter's normal function will be stopped.

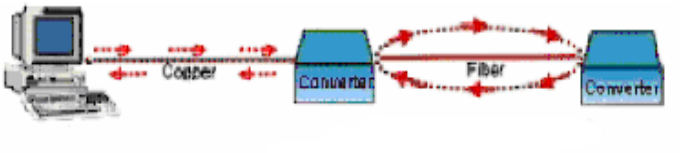


Fig: Remote Loopback (RLB)

NOTE: While performing Loopback test, either Remote or Local, it is recommended to test with more than 50% of full loaded traffic so LED indicator can work better. The lesser traffic will affect the LED's brightness.

1000BASE-T Port

The 1000BASE-T port supports network speed of 1000Mbps, and operates in full-duplex transfer mode. This port also offers automatic MDI/MDI-X crossover detection that gives true "plug and play" capability - just plug-in the network cable to the port and the port will adjust according to end node device. The RJ-45 connector is suitable for UTP cable Category 5.

1000BASE-SX/LX Port

The 1000BASE-SX/LX port adds a fiber Gigabit Ethernet link to your network device. Compliant with IEEE 802.3z, this port transmits data at 1000Mbps in full-duplex mode across distances of up to 220m over multi-mode fiber-optic cable. The fiber port has support with a choice of fiber connector types SC and WDM.

Installation

Note: The devices attached to each port can be connected and operating in any sequence, but the factory recommended procedure is as follows:

1. Converter power OFF
2. Set DIP switch(es) (ON or OFF)
3. Power ON the converter
4. Connect Fibre links
5. Connect Copper links

Desktop Installation

Follow the instructions listed below to install the Converter onto a desktop location.

1. Locate the Converter in a clean, flat and safe position that has easy access to AC power.
2. Affix the four (4) self-adhesive rubber pads to the underside of the Converter.
3. Apply AC power to the Converter. (The green PWR LED on the rear panel should light).
4. Connect cables from the network partner devices to the ports on the front panel. (The green LNK LED on the front panel associated with the port should light).

This converter can also be mounted on a vertical surface. Simply use the underside of the unit as a template to measure and mark out the position of the holes on to the surface where the unit is to be installed. Then use the two screws provided to mount the converter firmly in place.

Warning **Please exercise caution when using power tools. Also, install this unit away from damp or wet locations, or in close proximity to very hot surfaces. These types of environments can have a detrimental effect on the converter and cables. An ideal location is a lightly cooled place such as a typical equipment room.**

Powering On Unit

The Converter uses external power supply 12V DC at 0.8A, frequency 50~60 Hz.

1. Insert the power cable plug directly into the receptacle located at the back of the device.
2. Plug the power adapter into an available socket.
3. Check the rear-panel LED as the device is powered on to verify that the Power LED is lit. If not, check that the power cable is correctly and securely plugged in.

Note: For International use, you may need to change the AC power adapter cord. You must use a power cord set that has been approved for the receptacle type and electrical current in your country.

Connecting Fiber Cable

When connecting fiber cable to a 1000BASE-FX port on the Converter, be sure the correct type – SC or WDM - connector is used. Follow the steps below to properly connect fiber cabling:

1. Remove and keep the fiber port's rubber cover. When not connected to a fiber cable, the rubber cover should be replaced to protect the fiber optics.
2. Check that the fiber terminators are clean. You can clean the cable plugs by wiping them gently with a clean tissue or cotton ball moistened with a little ethanol. Dirty fiber terminators on fiber optic cables will impair the quality of the light transmitted through the cable and lead to degraded performance on the port.
3. Connect one end of the cable to the SC/WDM port on the Converter and the other end to the SC/WDM port on the other device.
4. Check the corresponding port LED on the Converter to ensure that the connection is valid. (Refer to the LED chart in next section)

Note: When inserting the cable, be sure the tab on the plug clicks into position to ensure that it is properly seated.

Warning Because invisible laser radiation may be emitted from the aperture of the fiber port when no cable is connected, avoid exposure to laser radiation and do not stare into the open apertures.

Connecting Copper Cable

The 1000BASE-T RJ-45 Ethernet port fully supports auto-sensing and auto-negotiation.

1. Insert one end of Category 5 twisted pair cable into an available RJ-45 port on the Converter and the other end into the port of the network node.
2. Check the corresponding port LED on the Converter to make sure that the connection is valid. (Refer to LED chart in next section)

3 LED Indicators

LED Table

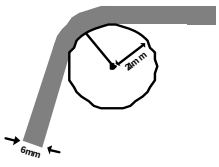
This converter has LED indicators located at the front of the device. The LEDs have been designed to give easy at-a-glance network status, and provides 'real-time' connectivity information. Please see below for an interpretation of their functions:

LED Indicators		
LED	**Condition**	**Status**
PWR	On (Green)	Converter is receiving power
	Off	Power off or failure
LNK	On (Green)	Link established with compliant device
	Off	No link established
FD	On (Green)	Copper Port is operating at full-duplex
	Off	Copper Port is operating at half-duplex
RCV	On (Amber)	Receiving data packets
	Flashing	Receiving data packets at a slower rate
	Off	No data packets received

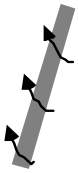
Appendix A

Cables

The following are some recommendations as to what you should and should not do when installing cables. Remember - cables are the deciding factor in network performance.

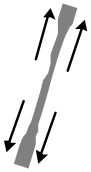


Try to maintain a bend radius of (min.) 4x the diameter of the cable for UTP and 100x for fiber.



Try not to allow the cable to twist too much - this creates a strain on the internal cables.

Place cable ties at regular intervals - do not over tighten cable ties - try to avoid using with fiber.



Do not stretch the cable especially on corners, in vertical cable trays and when spanning long distances.

Appendix B

About RJ-45 Cables

Use 100-ohm Category 5, 5e, or 6 unshielded twisted-pair (UTP) or shielded twisted-pair (STP) cable for 1000Base-T configurations. The pin assignments are as follows:

Pin	MDI Signal Name	MDI-X Signal Name
1	Bi-directional Data One Plus (BI_D1+)	Bi-directional Data Two Plus (BI_D2+)
2	Bi-directional Data One Minus (BI_D1-)	Bi-directional Data Two Minus (BI_D2-)
3	Bi-directional Data Two Plus (BI_D2+)	Bi-directional Data One Plus (BI_D1+)
4	Bi-directional Data Three Plus (BI_D3+)	Bi-directional Data Four Plus (BI_D4+)
5	Bi-Directional Data Three Minus (BI_D3-)	Bi-directional Data Four Minus (BI_D4-)
6	Bi-directional Data Two Minus (BI_D2-)	Bi-directional Data One Minus (BI_D1-)
7	Bi-directional Data Four Plus (BI_D4+)	Bi-directional Data One Plus (BI_D3+)
8	Bi-directional Data Four Minus (BI_D4-)	Bi-directional Data Three Minus (BI_D3-)

Cat 6 cable (568A type)

Pin 1 White - Green
Pin 2 Green
Pin 3 White - Orange
Pin 4 Blue
Pin 5 White - Blue
Pin 6 Orange

Pin	**7**	**White - Brown**
Pin	**8**	**Brown**

Cat 6 cable (568B type)

Pin	**1**	**White - Orange**
Pin	**2**	**Orange**
Pin	**3**	**White - Green**
Pin	**4**	**Blue**
Pin	**5**	**White - Blue**
Pin	**6**	**Green**
Pin	**7**	**White - Brown**
Pin	**8**	**Brown**

All Category 5 UTP cables that are used for 100BASE-TX connections should also work for 1000BASE-T, providing that all four wire pairs are connected. However, it is recommended that for all critical connections, or any new cable installations, Category 6 cable should be used.

Appendix C

Mini Converter Chassis

The Mini Converter Chassis was developed to accommodate just one media converter. The chassis provides protection for converter units and an option of AC or DC power supplies. Now, network designers can plan their Ethernet, Fast Ethernet, ATM, or Gigabit networks without having to worry about the power source. Furthermore, its unique size allows it to be installed in locations where space is limited.

Features

- Simple and easy to install
- Adds fiber connectivity to otherwise copper based networks
- Supports 10/100/1000Base, copper, fiber, single/multi-mode converters with, RJ-45, ST, SC, MT-RJ, VF-45, LC, WDM connectors
- Accommodating one media converter
- Suitable for all size of networks in all locations
- Provides internal AC or DC switching power supply
- Made from high quality durable steel
- Optional external redundant power adapter

Affixing Brackets

We have supplied 2 special panels that easily attaches to the Converter. This allows for the secure placement of the converter into the Chassis. It also seals off the front panel and allows the Chassis to function correctly.

Step 1 **Using a Phillips screwdriver, remove two screws from the side panels on the converter.**

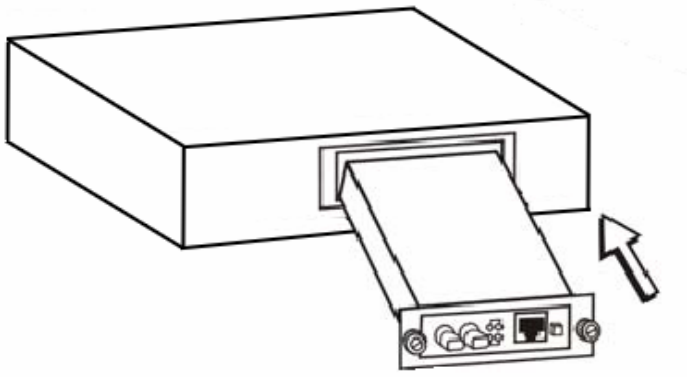
Step 2 **Place the converter and brackets on a flat horizontal surface as illustrated above. Secure the brackets by replacing the screws.**

Ensure that the rails are flush-mounted with the underside of the converter. The converter is now ready for loading in to the Chassis.

Installing the Converter

Once the Converter has been attached to the bracket, it can be installed into the Chassis. Special care must be taken to ensure the correct mating of the power connector. Align the converter so that it fits between the upper and lower guide rails.

Warning Always ensure that the converter power socket is positioned at the base of the Chassis. Never force the Converter into the Chassis - check power socket position and alignment.



Rear view of Chassis and specifications

Rear View of Chassis with AC Power Supply

Power: 90 - 240V AC (Optional 12V Adapter)
Dimensions: 109 x 174 x 44.3 mm (L x W x H)

Rear View of Chassis with DC Power Supply

Power: -48V DC (Optional 12V Adapter)
Dimensions: 109 x 174 x 44.3 mm (L x W x H)

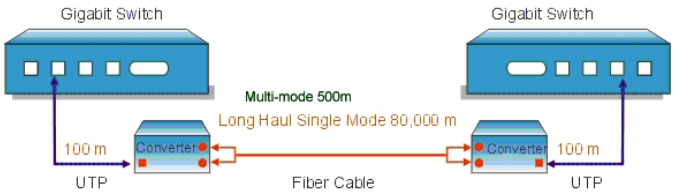
Appendix D

Application Diagram

To effectively expanding a Gigabit Ethernet network, position two converters back-to-back as illustrated.

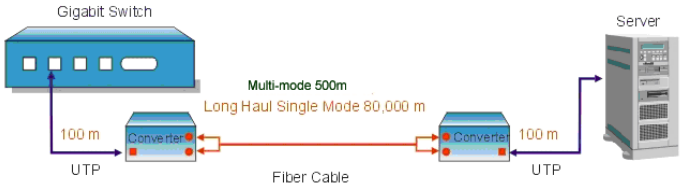
Application Diagram I

In the figure below, the Converter is functioning as a high-speed bridge between switches creating increased capacity for each user (node) on the local area network. It is providing a 1000Mbps full-duplex link to a variety of Gigabit Ethernet network devices within a LAN.



Application Diagram II

In the figure below, the Converter is functioning as a server aggregation for an enterprise or LAN configuration. It can provide a 1000Mbps full-duplex link to workgroups of 10/100 switches located on separate floors within a single building.



Application Diagram III

In the figure below, the Converter is functioning as a high-speed dedicated link within a campus network configuration. It is providing a 1000Mbps full-duplex link to a remote networking node.